

Success Story of the Open-Source Camera Stack: The Nokia N9 Case

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Mark Giam

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Source: http://en.wikipedia.org/wiki/Nokia_N900

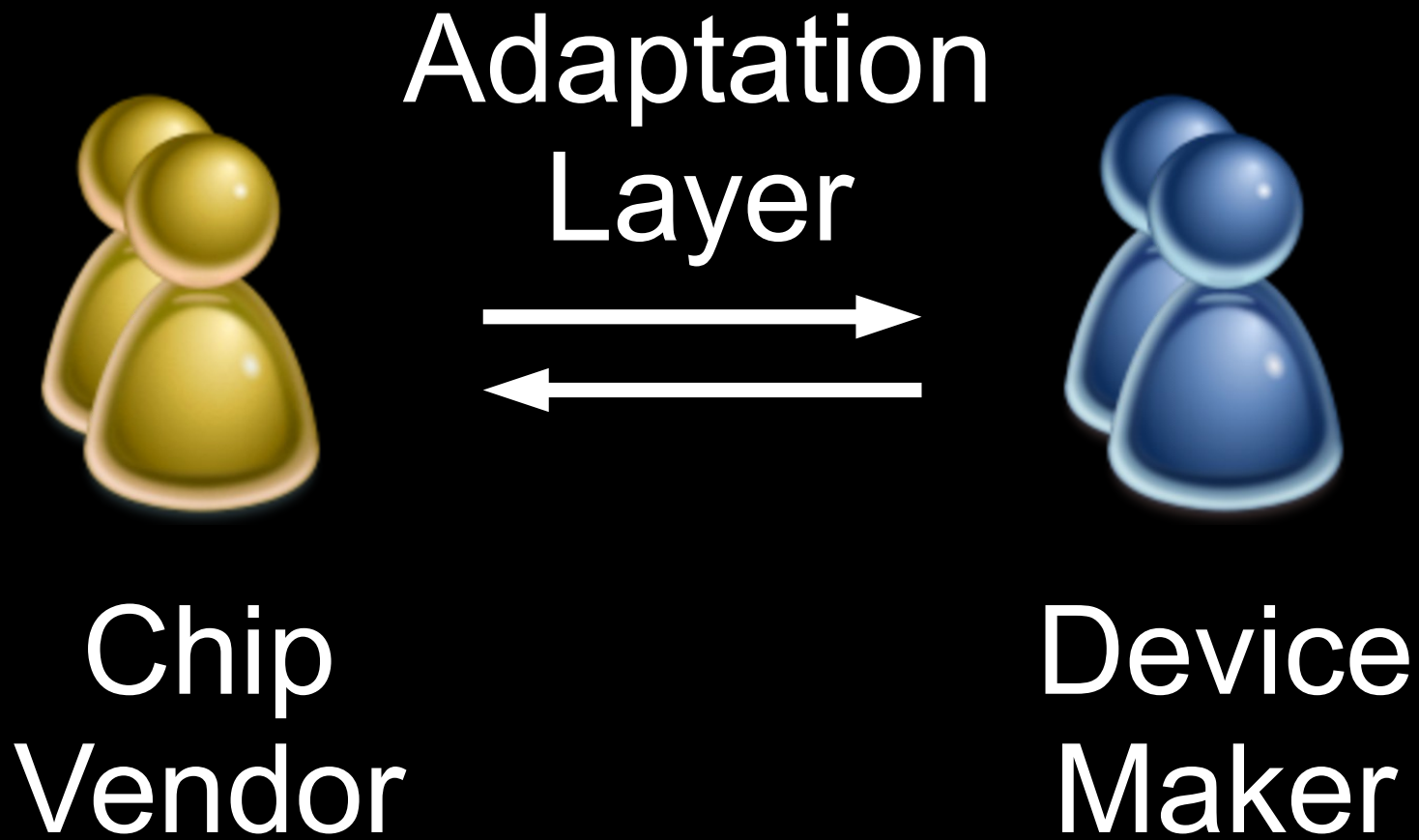


Application

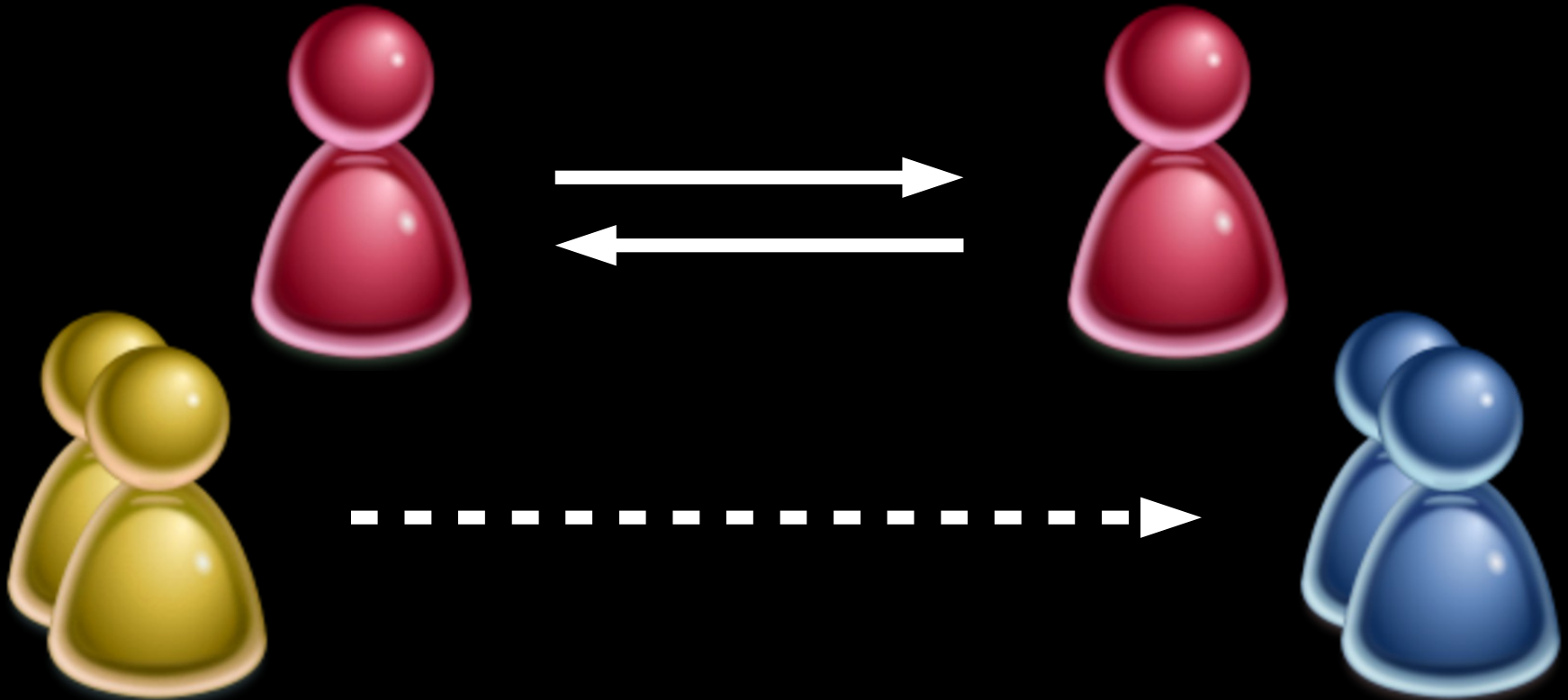
Middleware

Adaptation

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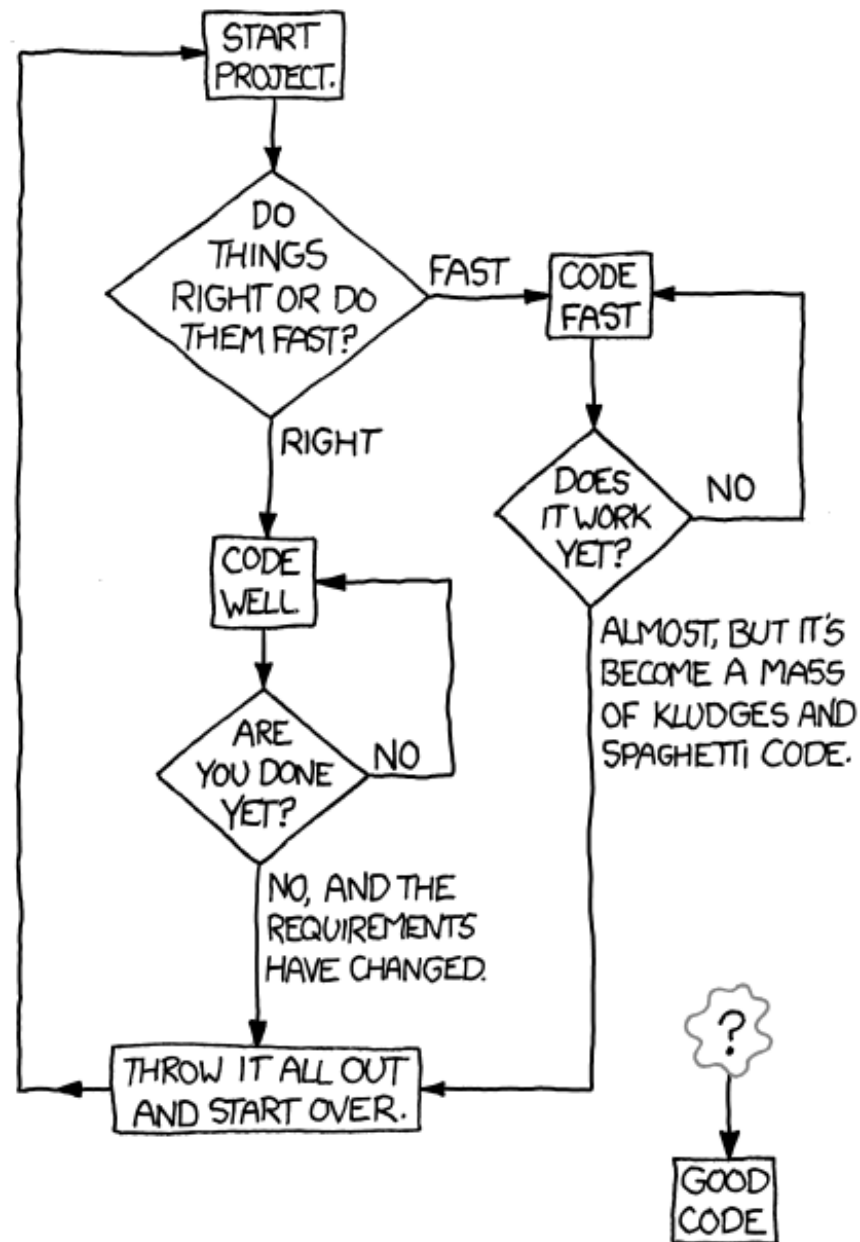
Management

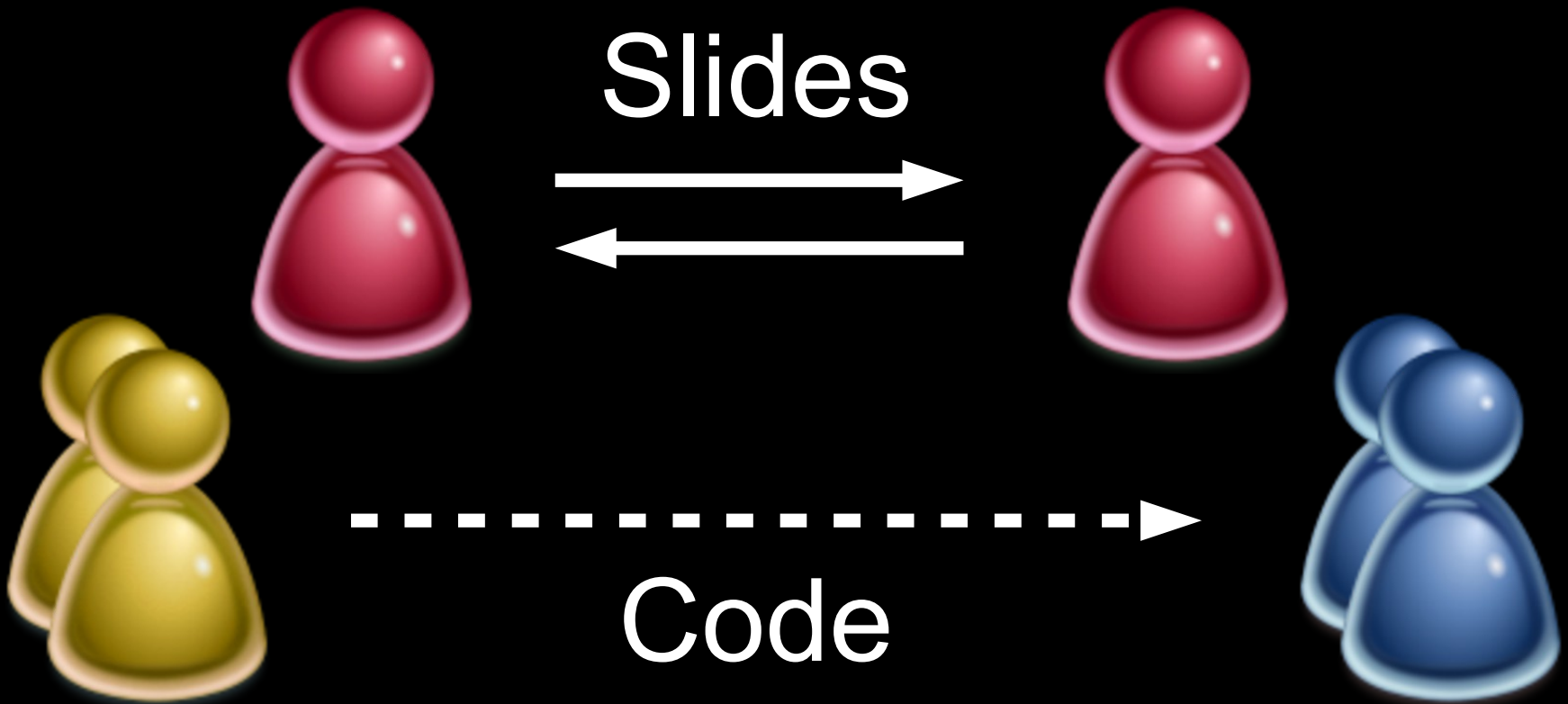


Development



HOW TO WRITE GOOD CODE:





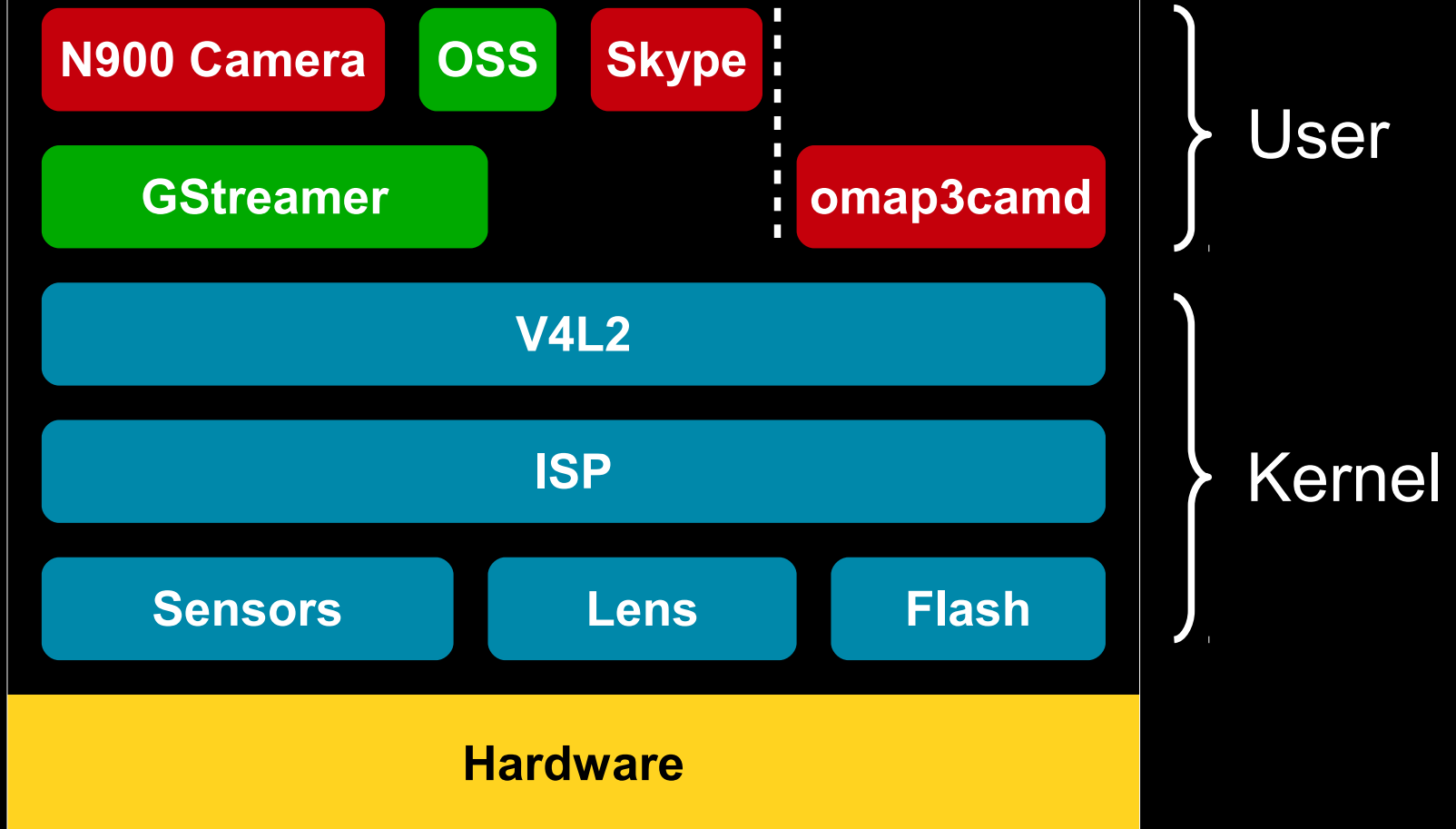


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	February 2009						
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07	9	10	11	12	13	14	15
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10	2	3	4	5	6	7	8



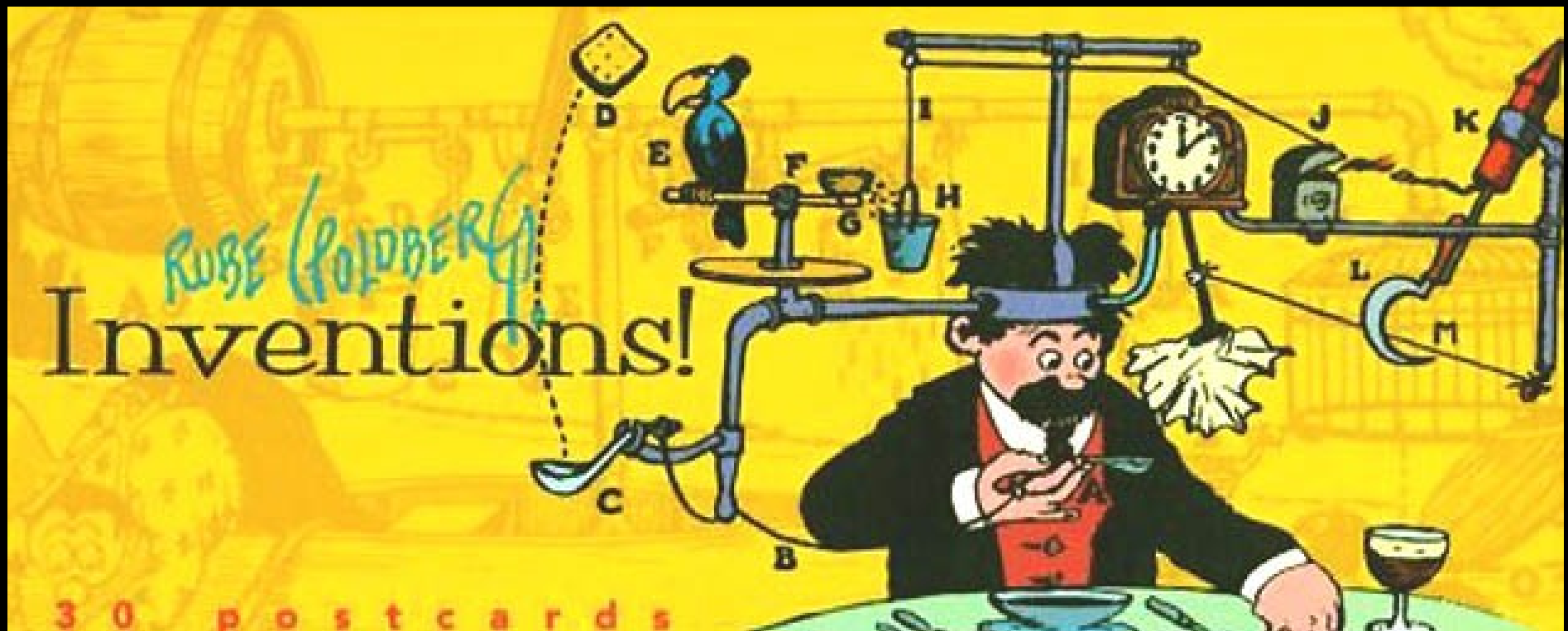
N900 Camera Stack

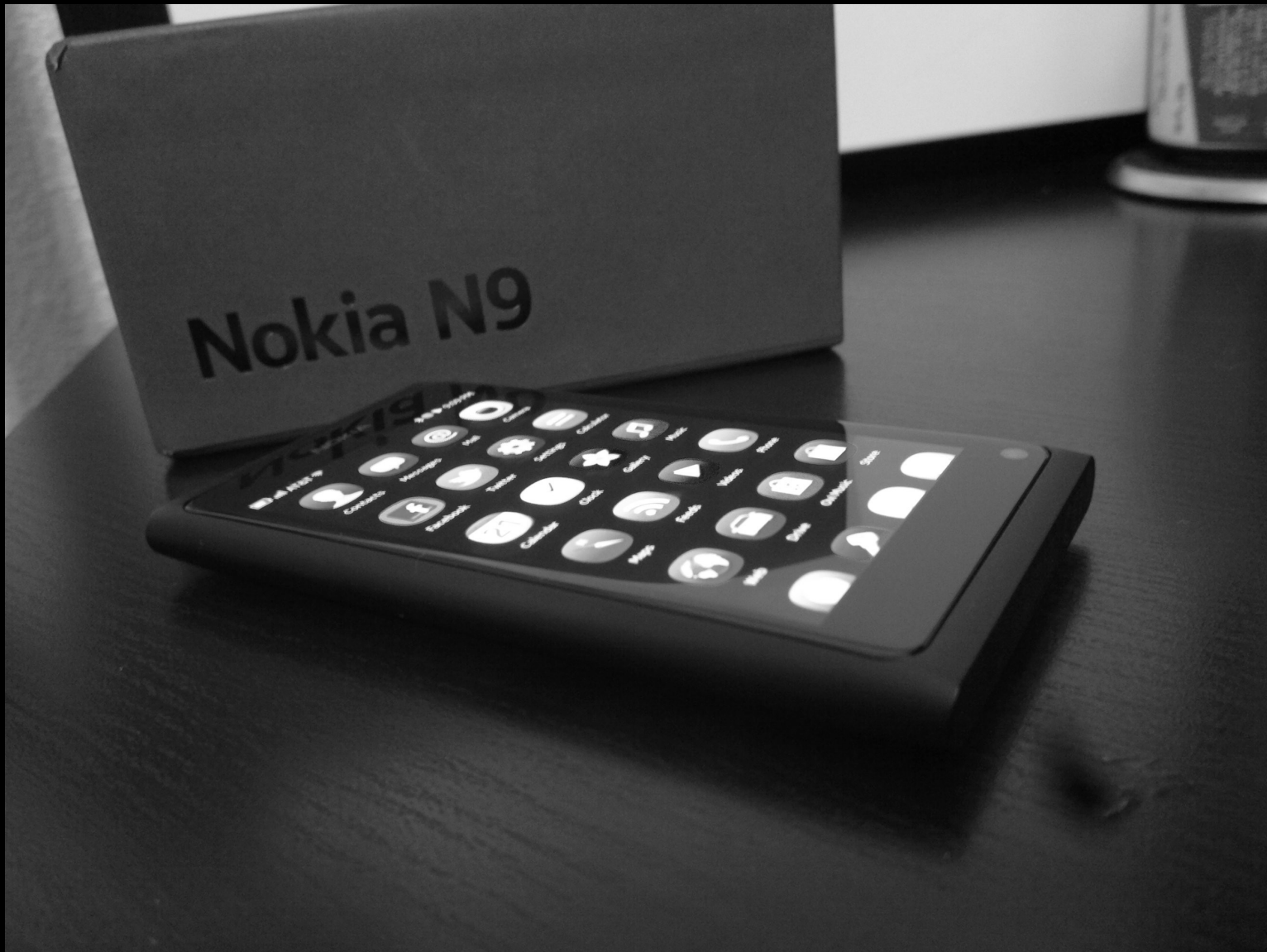


OSS Non-Free



Source: <http://www.magiclens.co.uk/View/249/Jenga>





Source: <http://www.themobilefanatics.com/nokia-n9-gone-in-60-seconds/>

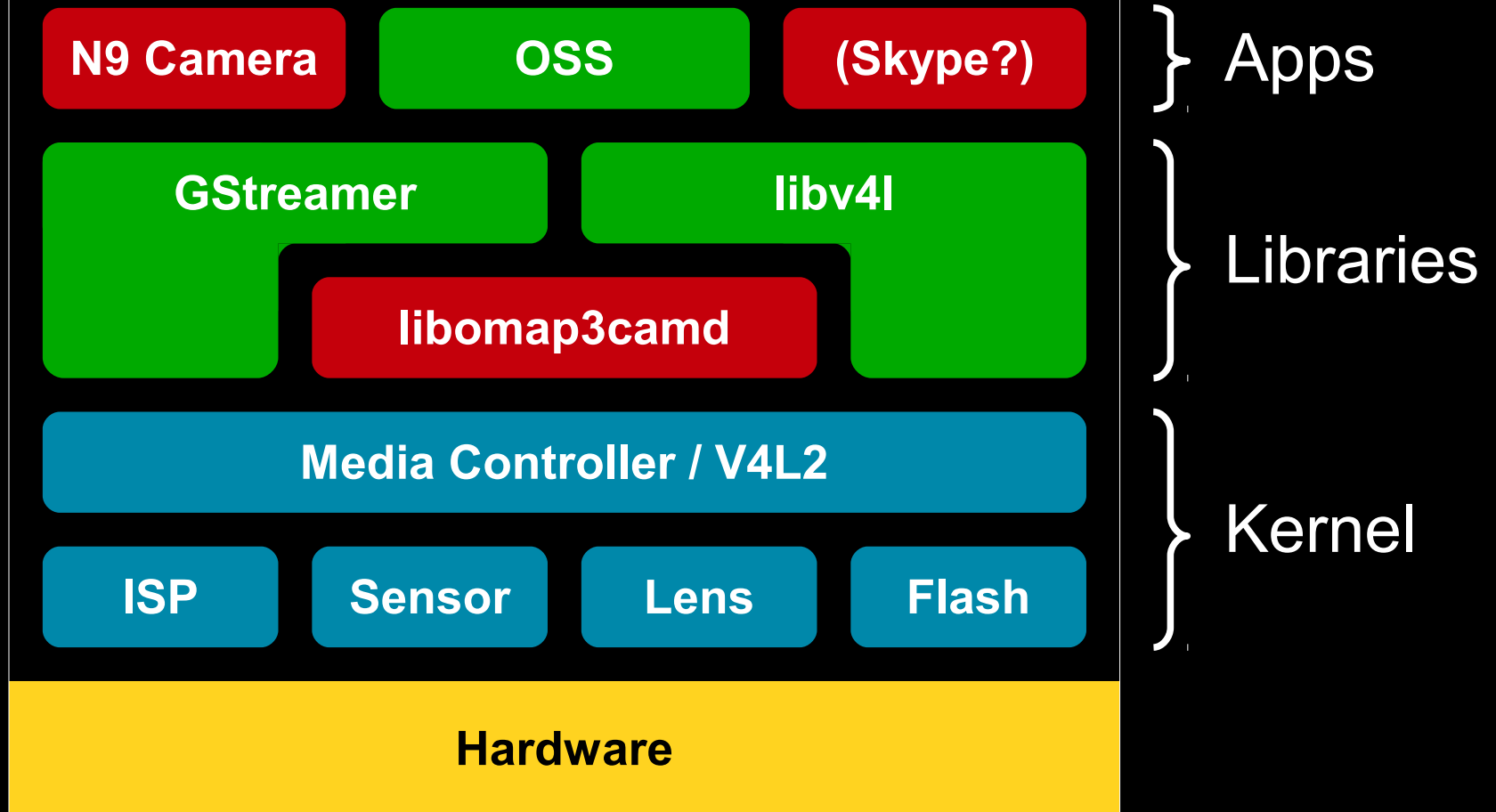
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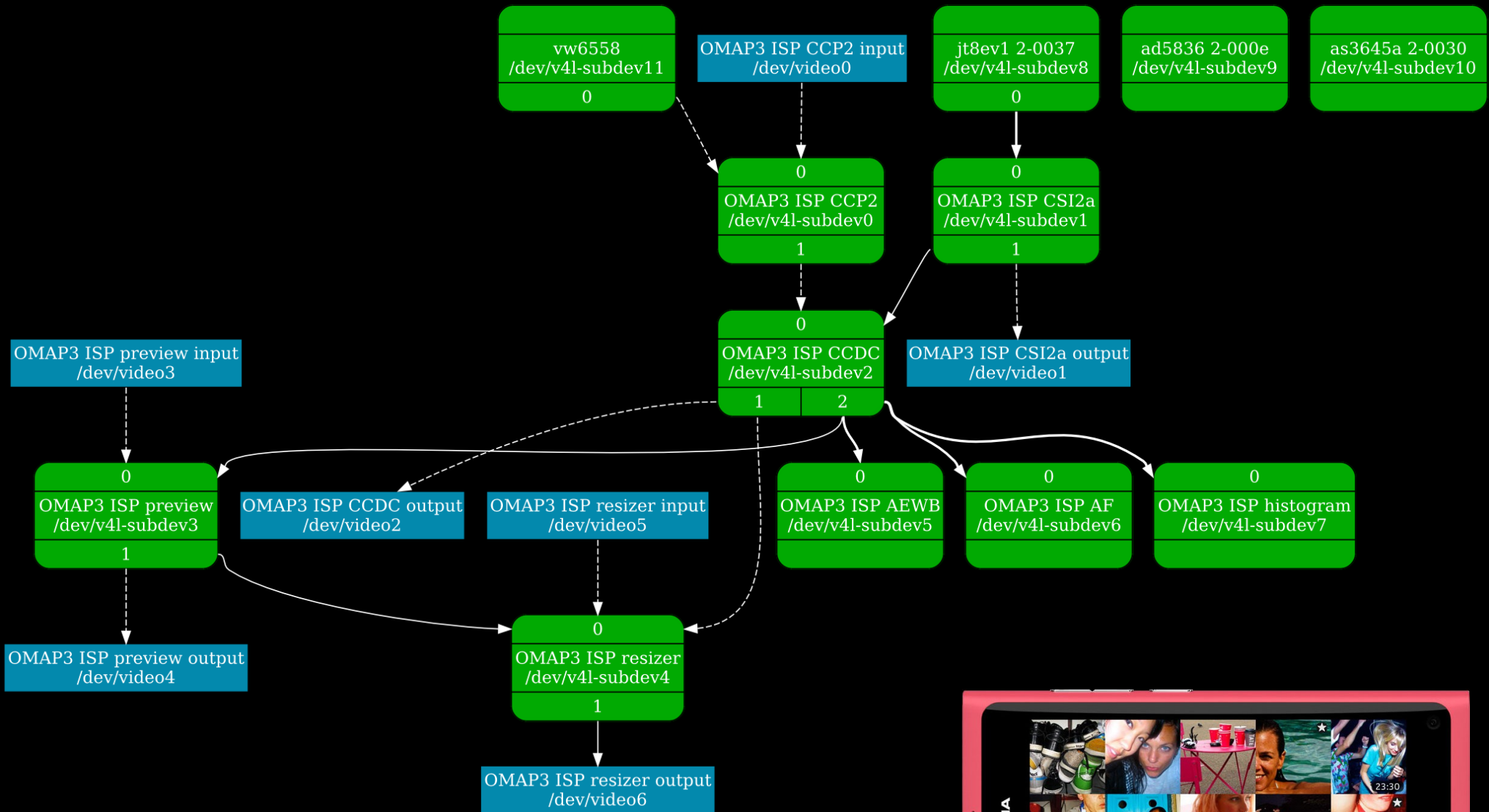
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Source: <http://www.vincentjamespia.com/2010/08/365-project-day-242-tower-falls.html>

N9 Camera Stack

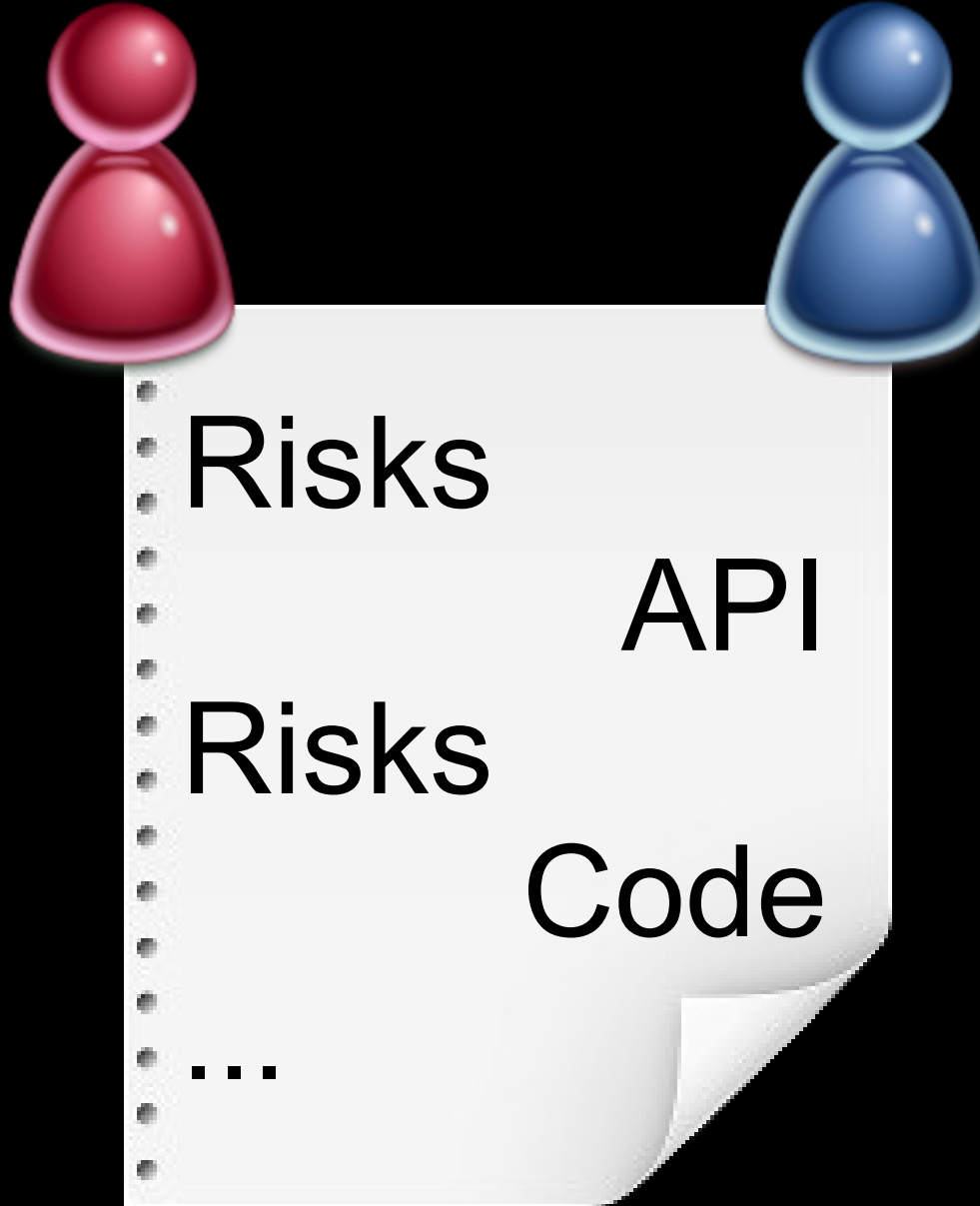






VS.







Media devices increasingly handle multiple related functions. Many USB cameras include microphones, video capture hardware can also output video, or SoC camera interfaces also perform memory-to-memory operations similar to video codecs.

Independent functions, even when implemented in the same hardware, can be modelled as separate devices. A USB camera with a microphone will be presented to userspace applications as V4L2 and ALSA capture devices. The devices' relationships (when using a webcam, end-users shouldn't have to manually select the associated USB microphone), while not made available directly to applications by the drivers, can usually be retrieved from sysfs.

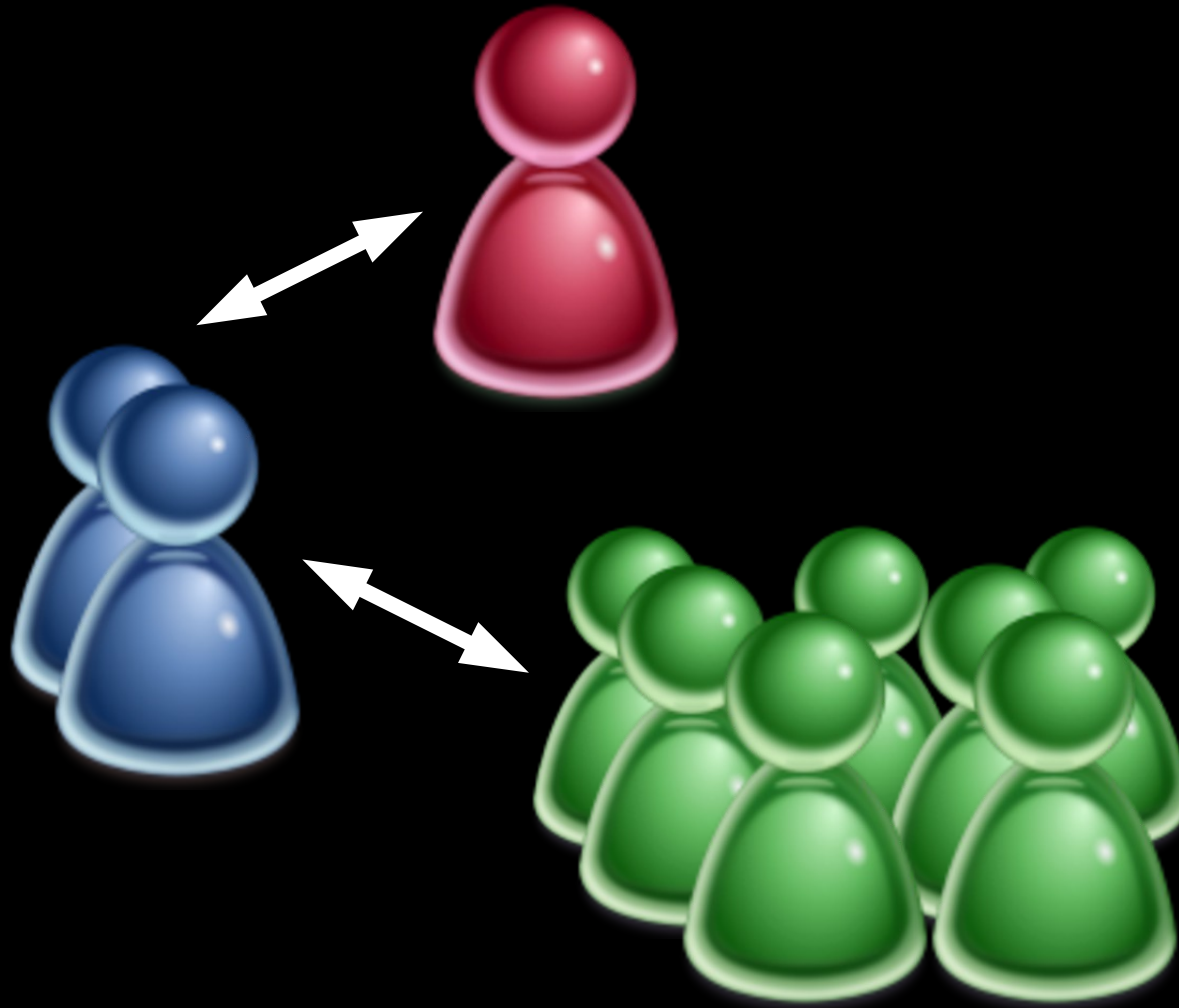
With more and more advanced SoC devices being introduced, the current approach will not scale. Device topologies are getting increasingly complex and can't always be represented by a tree structure. Hardware blocks are shared between different functions, creating dependencies between seemingly unrelated devices.

Kernel abstraction APIs such as V4L2 and ALSA provide means for applications to access hardware parameters. As newer hardware expose an increasingly high number of those parameters, drivers need to guess what applications really require based on limited information, thereby implementing policies that belong to userspace.

The [REDACTED] API aims at solving those problems.

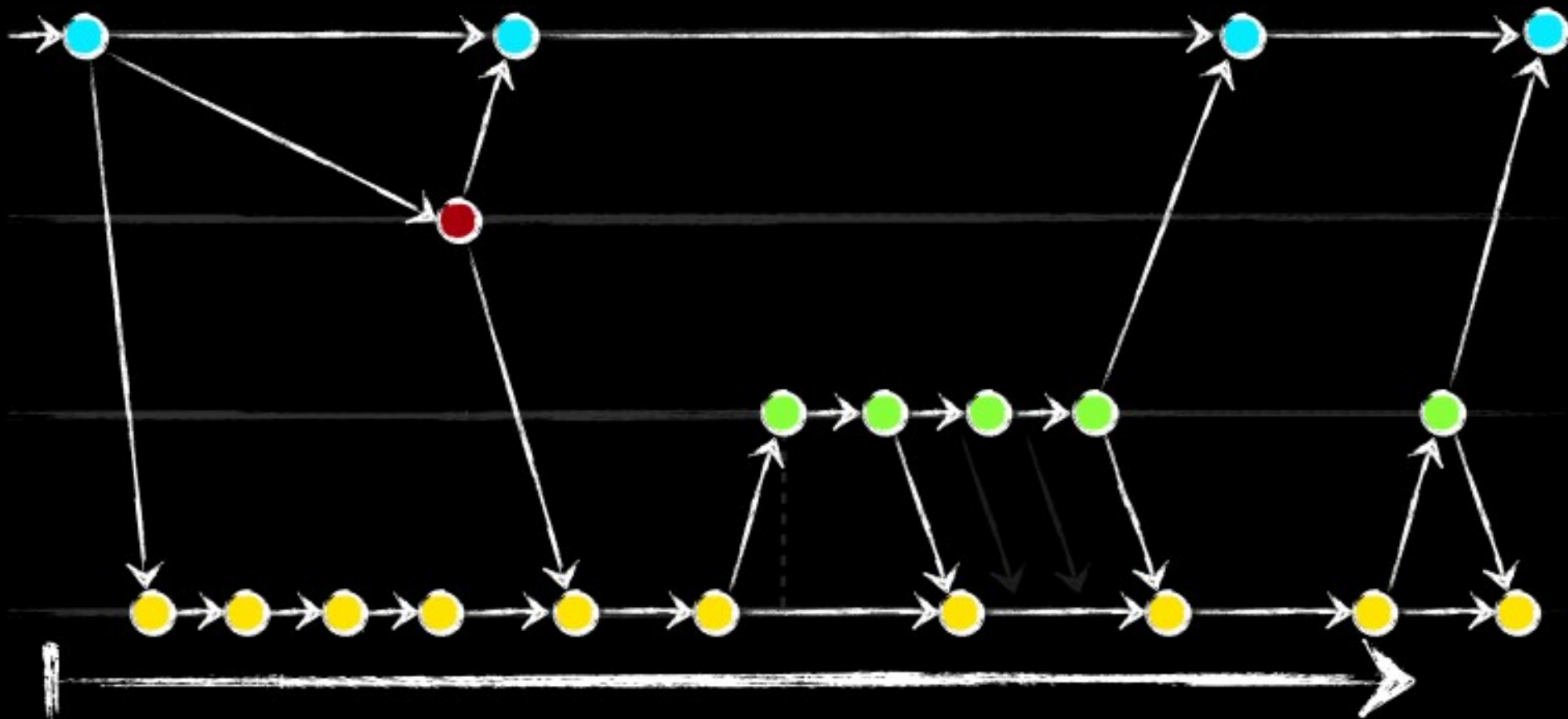
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Community

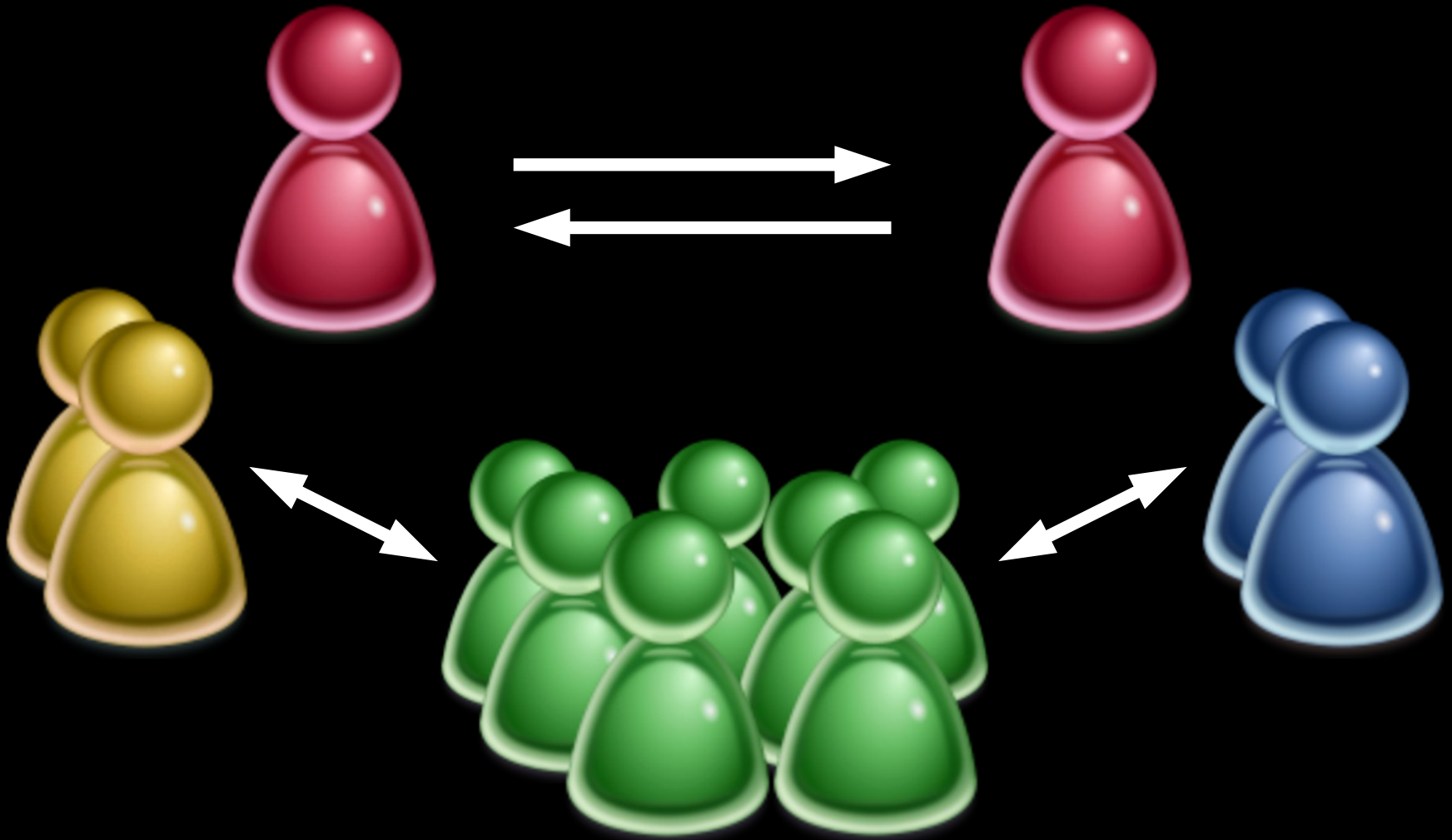
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Source: <http://gordonandthewhale.com/>



Community
QA Process



Subdev userspace API

- Control Framework • CMA •
- CREATE_BUFS • Community
- Subdev Interface • Buffers
- Sharing • Media controller •
- GstPhotography • videobuf2 •
- camerabin2 • Events API



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